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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/939,773	08/28/2001	Koji Kikuchi	SON-2192	3157

23353 7590 06/11/2003  
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WASHINGTON, DC 20036

EXAMINER

COLEMAN, WILLIAM D

ART UNIT PAPER NUMBER

2823

DATE MAILED: 06/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/939,773

Applicant(s)

KIKUCHI, KOJI

Examiner

W. David Coleman

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 02 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election without traverse of group I, claims 1-10 in Paper No. 8 is acknowledged.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krantz et al., U.S. Patent Application Publication No. U.S 2002/0171825 A1.

Krantz discloses a manufacturing method substantially as claimed.

4. Pertaining to claim 1, Krantz teaches a manufacturing method of a phase-shift mask, comprising: seeking a relationship of optical conditions of an exposure optical system used for exposure and a mask structure with displacement of a pattern to be transferred by exposure; finding said optical conditions and said mask structure that limit displacement of said pattern within a required range, taking manufacturing errors of the mask into consideration; examining the optical conditions and the mask structure obtained to determine whether they ensure a required exposure tolerance and a required focal depth; and executing fabrication of such a mask to obtain said mask structure when the result of the examination is acceptable [see Background of the Invention]. However, the terms "seeking a relationship of optical conditions", "examining the optical conditions" and "determine" are mental process steps. It would have been obvious to

one of ordinary skill in the art that these mental process steps takes place in the Krantz's semiconductor process in the fabrication of phase shift mask.

5. Pertaining to claim 2, Krantz teaches the manufacturing method of a phase-shift mask according to claim 1 wherein said optical conditions include, at least, a numerical aperture [0015] and a partial coherence factor [0103].
6. Pertaining to claim 3, Krantz teaches the manufacturing method of a phase-shift mask according to claim 1 wherein said phase-shift mask is a Levenson phase-shift mask[0031].
7. Pertaining to claim 4, Krantz teaches the manufacturing method of a phase-shift mask according to claim 3 wherein said Levenson phase-shift mask is of a substrate-excavation-type, and said mask structure is regulated by the amount of excavation of a substrate [0095].
8. Pertaining to claim 5, Krantz teaches the manufacturing method of a phase-shift mask according to claim 1 wherein said Levenson phase-shift mask is of a phase-shifter-added-type, and said mask structure is regulated by the thickness of a phase shifter [see FIG. 18A].
9. Pertaining to claim 6, Krantz teaches a method of making a resist pattern through exposure using a phase-shift mask, comprising:  
seeking a relationship of optical conditions of an  
exposure optical system used for exposure and a mask structure of  
said phase-shift mask with displacement of a pattern to be  
transferred by exposure;  
finding said optical conditions and said mask structure  
that limit displacement of said pattern within a required range,  
taking manufacturing errors of the mask into consideration;

examining the optical conditions and the mask structure obtained to determine whether they ensure a required exposure tolerance and a required focal depth; and when the result of the examination is acceptable, fixing said exposure optical system to the optical conditions selected, then actually manufacturing said phase-shift mask having the mask structure selected, and conducting exposure using said exposure optical system and said phase-shift mask. However, Krantz fails to use the terms "finding", and "examining". It would have been obvious to one of ordinary skill in the art that these mental process steps takes place in the Krantz's semiconductor process in the fabrication of phase shift mask.

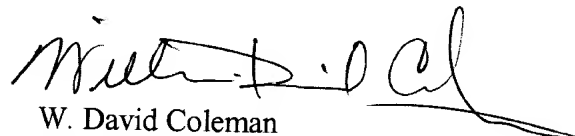
10. Pertaining to claim 7, Krantz teaches the method of making a resist pattern according to claim 6 wherein said optical conditions include, at least, a numerical aperture and a partial coherence factor.
11. Pertaining to claim 8, Krantz teaches the method of making a resist pattern according to claim 6 wherein said phase-shift mask is a Levenson phase-shift mask.
12. Pertaining to claim 9, Krantz teaches the method of making a resist pattern according to claim 8 wherein said Levenson phase-shift mask is of a substrate-excavation-type, and said mask structure is regulated by the amount of excavation of a substrate.
13. Pertaining to claim 10, Krantz teaches the method of making a resist pattern according to claim 8 wherein said Levenson phase-shift mask is of a phase-shifter-added-type, and said mask structure is regulated by the thickness of a phase shifter.

***Conclusion***

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to W. David Coleman whose telephone number is 703-305-0004. The examiner can normally be reached on 9:00 AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7721 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

  
W. David Coleman  
Primary Examiner  
Art Unit 2823

WDC  
June 4, 2003